Far East Journal of Mathematical Sciences 2017 vol.101 N6, pages 1253-1264

Approximation error of one finite-difference scheme for the problem of diffraction by a gradient layer

Anufrieva A., Rung E., Tumakov D.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2017 Pushpa Publishing House, Allahabad, India. The finite-difference scheme, constructed by the method of approximating an integral identity, is considered for a boundary value problem involving the one-dimensional Lame equations, which describe the problem of diffraction by gradient isotropic and transversal-isotropic layers. We prove that the finite-difference scheme is second-order accurate and can be recommended for use in solving the Lame equations with continuous coefficients.

http://dx.doi.org/10.17654/MS101061253

Keywords

Boundary value problem, Error of method, Finite-difference scheme, Lame equations

References

[1] A. V. Anufrieva, D. N. Tumakov and V. L. Kipot, Peculiarities of propagation of a plane elastic wave through a gradient layer, Proc. DD'13 (2013), pp. 11-16. http://dx.doi.org/10.1109/dd.2013.6712795

[2] A. Anufrieva and D. Tumakov, Diffraction of a plane elastic wave by a gradient transversely isotropic layer, Advances in Acoustics and Vibration 2013 (2013), ID 262067 (2013), 1-7. http://dx.doi.org/10.1155/2013/262067

[3] A. V. Anufrieva and D. N. Tumakov, On some of the peculiarities of propagation of an elastic wave through a gradient transversely isotropic layer, Proc. DD'14, 2014, pp. 23-28. http://dx.doi.org/10.1109/DD.2014.7036417.

[4] A. A. Samarskii, The Theory of Difference Schemes, Marcel Dekker, N.Y., 2001.

[5] A. V. Anufrieva, D. N. Tumakov and V. L. Kipot, Elastic wave propagation through a layer with graded-index distribution of density, Proc. DD'12, 2012, pp. 21-26, http://dx.doi.org/10.1109/DD.2012.6402745

[6] M. F. Pavlova and E. V. Rung, A convergence of an implicit difference scheme for the saturated-unsaturated filtration consolidation problem, Lobachevskii J. Math. 34(4) (2013), 392-405. http://dx.doi.org/10.1134/S1995080213040057

[7] A. V. Anufrieva, K. B. Igudesman and D. N. Tumakov, Peculiarities of elastic wave refraction from the layer with fractal distribution of density, Appl. Math. Sci. 8(118) (2014), 5875-5886. http://dx.doi.org/10.12988/ams.2014.46473

[8] A. V. Anufrieva, E. V. Rung and D. N. Tumakov, Application of a second-order accurate finite-difference method to problems of diffraction of elastic waves by gradient layers, IOP Conference Series: Materials Science and Engineering 158 (2016), ID 012008. http://iopscience.iop.org/1757-899X/158/1/012008.